Introductory Chemistry Lab: Properties of Paper Towels

Outcomes

As a result of today's lab session you will have:

Devised an experiment that assesses the absorbency of various paper towels.
Determined which of 3 brands of paper towels is the most absorbent.
Determined if each type of towel is stronger lengthwise or widthwise.
Determined which paper towel is the strongest overall.
Recorded your lab work in your laboratory journal

Prelab

Devise a way to evaluate how much water is absorbed by a paper towel. Bring a brief written procedure to discuss with your lab partner. You will discuss and mutually agree on a procedure for Part II.

Purpose

To design an experiment to determine which of three brands of paper towels is the most absorbent; determine if each brand of towel is stronger lengthwise or widthwise; and to decide which of the brands is the strongest.

Background

Since paper fibers run in primarily one direction, paper towels are typically stronger in that direction. In this test you'll determine for each brand which direction is stronger: lengthwise or widthwise; and then determine which towel brand is the strongest overall.

Procedure

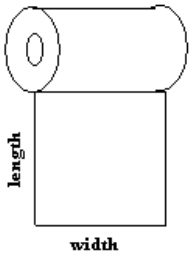
Part I. Determining the Dry-Strength of Paper Towels

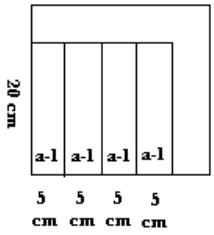
Background

Since paper fibers run in primarily one direction, paper towels are typically stronger in that direction. In this test you'll determine for each brand which direction is stronger: lengthwise or widthwise; and then determine which towel brand is the strongest overall.

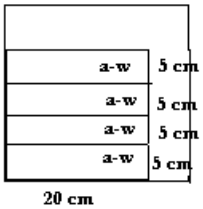
A. Directional Strength of each Brand

1. Cut one sheet of your first paper towel (brand A) into 5 lengthwise strips, 20 cm long by 5 cm wide. Code them A-L (for brand A, lengthwise direction). Be sure to indicate which actual brand corresponds to A.

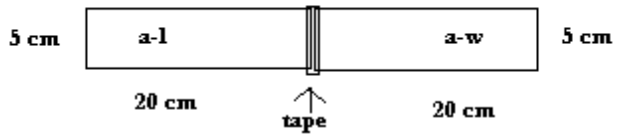




2. Cut a second sheet of towel A into 5 widthwise strips, 20 cm long by 5 cm wide. Code these strips A-W (for brand A, widthwise direction),



3. Lay the 5 cm side of the lengthwise strip next to the 5 cm side of the widthwise strip, center a piece of tape over the pieces of towel and tape together. Flip over and tape again.



4. Anchor one end of the strip to the lab bench. Pull the other end of the strip away from the table until the strips breaks. Record the strip that does not break (the strongest) in Table 1.

5. Repeat and record for trial 2. If a different direction breaks in the second trial, then do a third trial.

6. Repeat steps 1 through 5 for towel brands B and C.

B. Overall Strength

1. Use the data from Table 1 to fill in the blanks for the direction (L or W) of the brand tested in Table 2.

2. Tape the correct strips together for Test 1 (see step 3 of directional strength) and pull. Record the brand that does not break in table 3. Repeat the test and record the result. If the same brand does not break in the second trial, a third pull must be done.

8. Repeat step 2 for tests 2 and 3.

Clean Up

Discard all of the paper towels when the tests are done.

Part II. Determining the Absorbency of Paper Towels

Agree on a procedure for comparing the absorbency of three brands of paper towels. Write a brief procedure for Part II in your laboratory notebook. Create and label a data table for Part II. It should clearly list all of the measurements you and your partner will make. Carry out your experiment using the scientific processes of observation, data collection, and inference.

When you are finished clean and dry all glassware used and put away all equipment.

Data

Record the strongest direction for each towel in Table 1.

Table 1: Directional Strength of Each Brand

Test	Direction that does not break		
	Trial 1	Trial 2	Trial 3 (if needed)
A-W vs. A-L			
B-W vs. B-L			
C-W vs. C-L			

Record your overall strength test data in Table 2.

Table 2: **Overall Strength**

Test	Towels Tested	Stronger Towel		
		Trial 1	Trial 2	Trial 3 (if needed)
1	A- _____* against B- _____*			
2	B- _____* against C- _____*			
3	C- _____* against A- _____*			

Table 3: (this is the Absorbency Data Table you create for Part II)

Calculations– None required for this lab report.

Results

Copy the following Result Tables into your lab notebook after the data section (calculations) and then fill in with your observations.

Table 4: Dry-Strength Directional Test

Paper Towel	Strongest Direction
A	
B	
C	

Table 5: Best Brands

Property	Brand
Strongest	
Most Absorbent	

Conclusion

Indicate for each paper towel brand which direction was stronger: lengthwise or widthwise; and state which brand overall you found to be the strongest. Indicate which brand was most absorbent. Explain your choices.

Questions

1.

a . What were the drawbacks (things that could be improved) of the procedure that you used in Part II to determine which brand of paper towels is the most absorbent?

b. Knowing the drawbacks in part II, how could you make your experiment better?

2. How confident are you of your results and conclusion in Part II? Explain.

3. How confident are you of your results and conclusion in Part I? Explain.